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natural gas liquids as listed in Table MM-1 of this subpart. Any blender or refiner of refined or semi-refined petroleum products shall be considered an exporter if it otherwise satisfies the aforementioned definition.

§ 98.391 Reporting threshold.

Any supplier of petroleum products who meets the requirements of § 98.2(a)(4) must report GHG emissions.

§ 98.392 GHGs To report.

Suppliers of petroleum products must report the CO₂ emissions that would result from the complete combustion or oxidation of each petroleum product and natural gas liquid produced, used as feedstock, imported, or exported during the calendar year. Additionally, refiners must report CO₂ emissions that would result from the complete combustion or oxidation of any biomass co-processed with petroleum feedstocks.

§ 98.393 Calculating GHG emissions.

(a) *Calculation for individual products produced, imported, or exported.* (1) Except as provided in paragraphs (h) and (i) of this section, any refiner, importer, or exporter shall calculate CO₂ emissions from each individual petroleum product and natural gas liquid using Equation MM-1 of this section.

$$\text{CO}_{2i} = \text{Product}_i \star \text{EF}_i \quad (\text{Eq. MM-1})$$

Where:

CO_{2i} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid “i” (metric tons).

Product_i = Annual volume of product “i” produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate, and excludes products that entered the refinery but are not reported under § 98.396(a)(2). For natural gas liquids, volumes shall reflect the individual components of the product as listed in Table MM-1 to subpart MM.

EF_i = Product-specific CO₂ emission factor (metric tons CO₂ per barrel).

(2) In the event that an individual petroleum product is produced as a solid rather than liquid any refiner, importer, or exporter shall calculate CO₂

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emissions using Equation MM-1 of this section.

Where:

CO_{2i} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each petroleum product “i” (metric tons).

Product_i = Annual mass of product “i” produced, imported, or exported by the reporting party (metric tons). For refiners, this mass only includes products ex refinery gate, and excludes products that entered the refinery but are not reported under § 98.396(a)(2).

EF_i = Product-specific CO₂ emission factor (metric tons CO₂ per metric ton of product).

(b) *Calculation for individual products that enter a refinery as a non-crude feedstock.* (1) Except as provided in paragraphs (h) and (i) of this section, any refiner shall calculate CO₂ emissions from each non-crude feedstock using Equation MM-2 of this section.

$$\text{CO}_{2j} = \text{Feedstock}_j \star \text{EF}_j \quad (\text{Eq. MM-2})$$

Where:

CO_{2j} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).

Feedstock_j = Annual volume of a petroleum product or natural gas liquid “j” that enters the refinery to be further refined or otherwise used on site (barrels). For natural gas liquids, volumes shall reflect the individual components of the product as listed in table MM-1 of this subpart.

EF_j = Feedstock-specific CO₂ emission factor (metric tons CO₂ per barrel).

(2) In the event that a non-crude feedstock enters a refinery as a solid rather than liquid, the refiner shall calculate CO₂ emissions using Equation MM-2 of this section.

Where:

CO_{2j} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).

Feedstock_j = Annual mass of a petroleum product “j” that enters the refinery to be further refined or otherwise used on site (metric tons).

EF_j = Feedstock-specific CO₂ emission factor (metric tons CO₂ per metric ton of feedstock).

(c) *Calculation for biomass co-processed with petroleum feedstocks.* (1) Refiners shall calculate CO₂ emissions from

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each type of biomass that enters a refinery and is co-processed with petroleum feedstocks using Equation MM-3 of this section.

$$\text{CO}_{2m} = \text{Biomass}_m \star \text{EF}_m \quad (\text{Eq. MM-3})$$

Where:

CO_{2m} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each type of biomass “m” (metric tons).

Biomass_m = Annual volume of a specific type of biomass that enters the refinery and is co-processed with petroleum feedstocks to produce a petroleum product reported under paragraph (a) of this section (barrels).

EF_m = Biomass-specific CO₂ emission factor (metric tons CO₂ per barrel).

(2) In the event that biomass enters a refinery as a solid rather than liquid and is co-processed with petroleum

feedstocks, the refiner shall calculate CO₂ emissions from each type of biomass using Equation MM-3 of this section.

Where:

CO_{2m} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each type of biomass “m” (metric tons).

Biomass_m = Total annual mass of a specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported under paragraph (a) of this section (metric tons).

EF_m = Biomass-specific CO₂ emission factor (metric tons CO₂ per metric ton of biomass).

(d) *Summary calculation for refinery products.* Refiners shall calculate annual CO₂ emissions from all products using Equation MM-4 of this section.

$$\text{CO}_{2r} = \sum(\text{CO}_{2i}) - \sum(\text{CO}_{2j}) - \sum(\text{CO}_{2m}) \quad (\text{Eq. MM-4})$$

Where:

CO_{2r} = Annual CO₂ emissions that would result from the complete combustion or oxidation of all petroleum products and natural gas liquids (ex refinery gate) minus non-crude feedstocks and any biomass to be co-processed with petroleum feedstocks.

CO_{2i} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid “i” (metric tons).

CO_{2j} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).

CO_{2m} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each type of biomass “m” (metric tons).

(e) *Summary calculation for importer and exporter products.* Importers and exporters shall calculate annual CO₂ emissions from all petroleum products and natural gas liquids imported or exported, respectively, using Equations MM-1 and MM-5 of this section.

$$\text{CO}_{2x} = \sum(\text{CO}_{2i}) \quad (\text{Eq. MM-5})$$

Where:

CO_{2i} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid “i” (metric tons).

CO_{2x} = Annual CO₂ emissions that would result from the complete combustion or oxidation of all petroleum products and natural gas liquids.

(f) *Emission factors for petroleum products and natural gas liquids.* The emission factor ($\text{EF}_{i,j}$) for each petroleum product and natural gas liquid shall be determined using either of the calculation methods described in paragraphs (f)(1) or (f)(2) of this section. The same calculation method must be used for the entire quantity of the product for the reporting year. For refiners, the quantity of a product that enters a refinery (i.e., a non-crude feedstock) is considered separate from the quantity of a product ex refinery gate.

(1) *Calculation Method 1.* To determine the emission factor (i.e., EF_i in Equation MM-1) for solid products, multiply the default carbon share factor (i.e., percent carbon by mass) in column B of Table MM-1 to this subpart for the appropriate product by 44/

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12. For all other products, use the default CO₂ emission factor listed in column C of Table MM-1 of this subpart for the appropriate product.

(2) *Calculation Method 2.* (i) For solid products, develop emission factors according to Equation MM-6 of this section using a value of 1 for density and

direct measurements of carbon share according to methods set forth in § 98.394(c). For all other products, develop emission factors according to Equation MM-6 of this section using direct measurements of density and carbon share according to methods set forth in § 98.394(c).

$$EF_{i,j} = \text{Density} \star \text{Carbon Share} \star (44/12) \quad (\text{Eq. MM-6})$$

Where:

$EF_{i,j}$ = Emission factor of the petroleum product or natural gas liquid (metric tons CO₂ per barrel or per metric ton of product).

Density = Density of the petroleum product or natural gas liquid (metric tons per barrel for non-solid products, 1 for solid products).

Carbon share = Percent of total mass that carbon represents in the petroleum product or natural gas liquid, expressed as a

fraction (e.g., 75% would be expressed as 0.75 in the above equation).

44/12 = Conversion factor for carbon to carbon dioxide.

(ii) If you use a standard method that involves gas chromatography to determine the percent mass of each component in a product, calculate the product's carbon share using Equation MM-7 of this section.

$$\text{Carbon Share} = \sum (\% \text{Composition}_{i...n} \star \% \text{Mass}_{i...n}) \quad (\text{Eq. MM-7})$$

Where:

Carbon Share = Percent of total mass that carbon represents in the petroleum product or natural gas liquid.

$\% \text{Composition } i \star \dots \star n$ = Percent of total mass that each molecular component in the petroleum product or natural gas liquid represents as determined by the procedures in the selected standard method.

$\% \text{Mass}_{i \star \dots \star n}$ = Percent of total mass that carbon represents in each molecular component of the petroleum product or natural gas liquid.

(g) *Emission factors for biomass co-processed with petroleum feedstocks.* Refiners shall use the most appropriate default CO₂ emission factor (EF_m) for biomass in Table MM-2 of this subpart to calculate CO₂ emissions in paragraph (c) of this section.

(h) *Special procedures for blended biomass-based fuels.* In the event that some portion of a petroleum product is biomass-based and was not derived by co-processing biomass and petroleum feedstocks together (i.e., the petroleum product was produced by blending a petroleum-based product with a biomass-based fuel), the reporting party shall calculate emissions for the petroleum product according to one of the methods in paragraphs (h)(1) through (h)(4) of this section, as appropriate.

(1) A reporter using Calculation Method 1 to determine the emission factor of a petroleum product shall calculate the CO₂ emissions associated with that product using Equation MM-8 of this section in place of Equation MM-1 of this section.

$$CO_{2i} = \text{Product}_i \star EF_i \star \% \text{Vol}_i \quad (\text{Eq. MM-8})$$

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Where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each petroleum product "i" (metric tons).

$Product_i$ = Annual volume of each petroleum product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate.

EF_i = Petroleum product-specific CO_2 emission factor (metric tons CO_2 per barrel) from Table MM-1 of this subpart.

$\%Vol_i$ = Percent volume of product "i" that is petroleum-based, not including any de-

natrant that may be present in any ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(2) A refinery using Calculation Method 1 of this subpart to determine the emission factor of a non-crude petroleum feedstock shall calculate the CO_2 emissions associated with that feedstock using Equation MM-9 of this section in place of Equation MM-2 of this section.

$$CO_{2j} = Feedstock_j * EF_j * \%Vol_j \quad (\text{Eq. MM-9})$$

Where:

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).

$Feedstock_j$ = Annual volume of each petroleum product "j" that enters the refinery as a feedstock to be further refined or otherwise used on site (barrels).

EF_j = Non-crude petroleum feedstock-specific CO_2 emission factor (metric tons CO_2 per barrel).

$\%Vol_j$ = Percent volume of feedstock "j" that is petroleum-based, not including any denaturant that may be present in

any ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(3) *Calculation Method 2 procedures for products.* (i) A reporter using Calculation Method 2 of this subpart to determine the emission factor of a petroleum product that does not contain denatured ethanol must calculate the CO_2 emissions associated with that product using Equation MM-10 of this section in place of Equation MM-1 of this section.

$$CO_{2i} = (Product_i * EF_i) - (Product_i * EF_m * \%Vol_m) \quad (\text{Eq. MM-10})$$

where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each product "i" (metric tons).

$Product_i$ = Annual volume of each petroleum product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate.

EF_i = Product-specific CO_2 emission factor (metric tons CO_2 per barrel).

EF_m = Default CO_2 emission factor from Table MM-2 to subpart MM that most closely represents the component of product "i" that is biomass-based.

$\%Vol_m$ = Percent volume of petroleum product "i" that is biomass-based, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(ii) In the event that a petroleum product contains denatured ethanol,

importers and exporters must follow Calculation Method 1 procedures in paragraph (h)(1) of this section; and refineries must sample the petroleum portion of the blended biomass-based fuel prior to blending and calculate CO_2 emissions using Equation MM-10a of this section.

$$CO_{2i} = Product_p * EF_i \quad (\text{Eq. MM-10a})$$

where:

CO_{2i} = Annual CO_2 emissions that would result from the complete combustion or oxidation of each biomass-blended fuel "i" (metric tons).

$Product_p$ = Annual volume of the petroleum-based portion of each biomass blended fuel "i" produced by the refiner (barrels).

EF_j = Petroleum product-specific CO₂ emission factor (metric tons CO₂ per barrel).

(4) *Calculation Method 2 procedures for non-crude feedstocks.* (i) A refiner using Calculation Method 2 of this subpart to determine the emission factor of a non-

crude petroleum feedstock that does not contain denatured ethanol must calculate the CO₂ emissions associated with that feedstock using Equation MM-11 of this section in place of Equation MM-2 of this section.

$$\text{CO}_{2j} = (\text{Feedstock}_j * \text{EF}_j) - (\text{Feedstock}_j * \text{EF}_m * \% \text{Vol}_m) \quad (\text{Eq. MM-11})$$

where:

CO_{2j} = Annual CO₂ emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).

Feedstock_j = Annual volume of each petroleum product “j” that enters the refinery to be further refined or otherwise used on site (barrels).

EF_j = Feedstock-specific CO₂ emission factor (metric tons CO₂ per barrel).

EF_m = Default CO₂ emission factor from Table MM-2 to subpart MM that most closely represents the component of petroleum product “j” that is biomass-based.

%Vol_m = Percent volume of non-crude feedstock “j” that is biomass-based, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(ii) In the event that a non-crude feedstock contains denatured ethanol, refiners must follow Calculation Method 1 procedures in paragraph (h)(2) of this section.

(i) *Optional procedures for blended products that do not contain biomass.* (1) In the event that a reporter produces, imports, or exports a blended product that does not include biomass, the reporter may calculate emissions for the blended product according to the method in paragraph (i)(2) of this section. In

the event that a refiner receives a blended non-crude feedstock that does not include biomass, the refiner may calculate emission for the blended non-crude feedstock according to the method in paragraph (i)(3) of this section. The procedures in this section may be used only if all of the following criteria are met:

(i) The reporter knows the relative proportion of each component of the blend (i.e., the mass or volume percentage).

(ii) Each component of blended product “i” or blended non-crude feedstock “j” meets the strict definition of a product listed in Table MM-1 to subpart MM.

(iii) The blended product or non-crude feedstock is not comprised entirely of natural gas liquids.

(iv) The reporter uses Calculation Method 1.

(v) Solid components are blended only with other solid components.

(2) The reporter must calculate emissions for the blended product using Equation MM-12 of this section in place of Equation MM-1 of this section.

$$\text{CO}_{2i} = \sum [\text{Blending Component}_{i...n} * \text{EF}_{i...n}] \quad (\text{Eq. MM-12})$$

where:

CO_{2i} = Annual CO₂ emissions that would result from the complete combustion or oxidation of a blended product “i” (metric tons).

Blending Component_{i...n} = Annual volume or mass of each blending component that is blended (barrels or metric tons).

EF_{i...n} = CO₂ emission factors specific to each blending component (metric tons CO₂ per barrel or per metric ton of product).

n = Number of blending components blended into blended product “i”.

(3) For refineries, the reporter must calculate emissions for the blended non-crude feedstock using Equation

MM-13 of this section in place of Equation MM-2 of this section.

$$CO_{2i} = \sum \left[\text{Blending Component}_{i..n} * EF_{i..n} \right] \quad (\text{Eq. MM-13})$$

where:

CO_{2j} = Annual CO_2 emissions that would result from the complete combustion or oxidation of a blended non-crude feedstock “j” (metric tons).

Blending Component $_{i..n}$ = Annual volume or mass of each blending component that is blended (barrels or metric tons).

$EF_{i..n}$ = CO_2 emission factors specific to each blending component (metric tons CO_2 per barrel or per metric ton of product).

n = Number of blending components blended into blended non-crude feedstock “j”.

(4) For refineries, if a blending component “k” used in paragraph (i)(2) of this section enters the refinery before blending as non-crude feedstock:

(i) The emissions that would result from the complete combustion or oxidation of non-crude feedstock “k” must still be calculated separately using Equation MM-2 of this section and applied in Equation MM-4 of this section.

(ii) The quantity of blending component “k” applied in Equation MM-12 of this section and the quantity of non-crude feedstock “k” applied in Equation MM-2 of this section must be determined using the same method or practice.

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§ 98.394 Monitoring and QA/QC requirements.

(a) *Determination of quantity.* (1) The quantity of petroleum products, natural gas liquids, and biomass, shall be determined as follows:

(i) Where an appropriate standard method published by a consensus-based standards organization exists, such a method shall be used. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB).

(ii) Where no appropriate standard method developed by a consensus-based standards organization exists, industry standard practices shall be followed.

(iii) For products that are liquid at 60 degrees Fahrenheit and one standard atmosphere, all measurements of quantity shall be temperature-adjusted and pressure-adjusted to these conditions. For all other products, reporters shall use appropriate standard conditions specified in the standard method; if temperature and pressure conditions are not specified in the standard method or if a reporter uses an industry standard practice to determine quantity, the reporter shall use appropriate standard conditions according to established industry practices.

(2) All measurement equipment (including, but not limited to, flow meters and tank gauges) used for compliance with this subpart shall be appropriate for the standard method or industry standard practice followed under paragraph (a)(1)(i) or (a)(1)(ii) of this section.

(3) The annual quantity of crude oil received shall be determined according to one of the following methods. You may use an appropriate standard method published by a consensus-based standards organization or you may use an industry standard practice.

(b) *Equipment Calibration.* (1) All measurement equipment shall be calibrated prior to its first use for reporting under this subpart, using an appropriate standard method published by a consensus based standards organization or according to the equipment manufacturer's directions.

(2) Measurement equipment shall be recalibrated at the minimum frequency specified by the standard method used